Chest PA and Lateral Search Pattern

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Overview

- Systematic approach, checklist
- Get into routine: Methodic / scholarly
- Check everything on the images
- Required structures
  - Recall normal radiographic anatomy
- Systematic description, Patterns
- Summary

Search Pattern: "Checklist"

- Not dissimilar to pilots checklist
- Many things are missed because they are simply overlooked
- Radiology Interpretive Steps: ID CD
- Important to do in order, don't jump to dx
  - Helps think through the process and arrive at dx

ID CD*:
Clinical (hence radiological) Reasoning

First state exam projection and anatomic region
eg. PA and Lateral chest demonstrates…

- I dentify the abnormality
- D efine the appearance (be descriptive)
- C ategorize (when able); patterns, grades
- D ifferential Diagnosis
  - General
  - Specific

MedPix Factoid:
http://rad.usuhs.mil/medpix/medpix.html?mode=single&recnum=6943

Process, Reasoning Comparison:

Medicine	Law	Aeronautics
Identify	Issue	Assess the situation
Describe	Rule	Maintain aircraft control
Categorize	Analysis	Follow emergency checklist
Differential	Conclusion	Take appropriate action

Other Checklist Rhymes

- Red, Right, Returning
- Aviate, Navigate, Communicate
- GUMPS: Gas selector, Undercarriage, Mixture rich, Prop full forward, Speed
- Turn, Time, Throttle, Twist, Talk
- Conclusion: mnemonics help many folks in many disciplines recall lists of info.
  - Save valuable brain "real estate" for important info

PRELIMINARIES

1. Verify patient information and date on both films and position of LEFT or RIGHT marker on frontal.

Usually on upper corner of film or digital image;

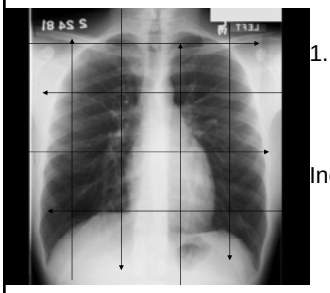
2. Note adequacy of penetration and any technical defects.

KV (penetration)

MaS (density)

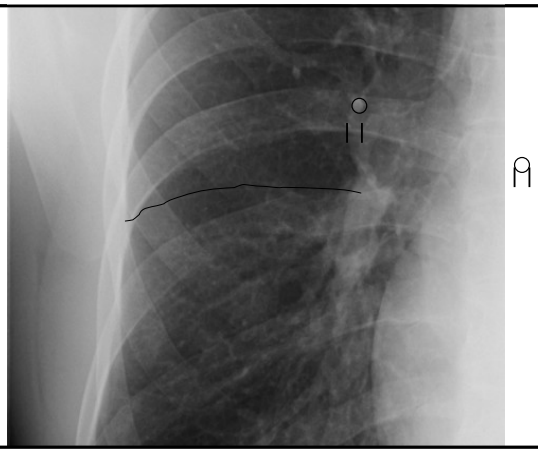
3. Look briefly at the entirety of both films for obvious abnormalities: Big picture

- PA (or AP portable)

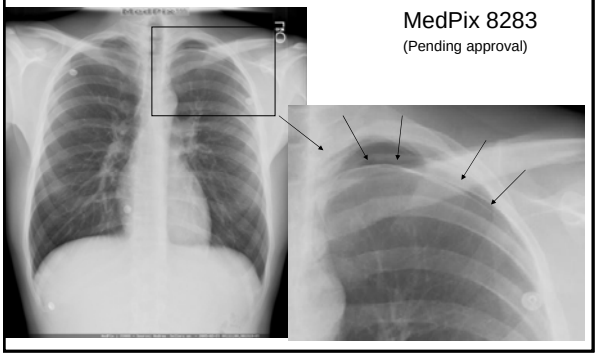


1. Study the lungs, both up and down and side to side.

Include lung volumes and symmetry of markings

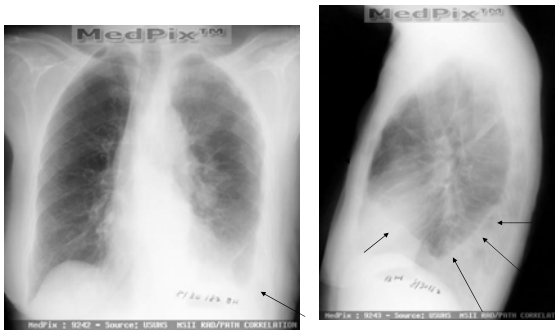


- 2. Check periphery of lungs for pneumothorax and/or effusions.*

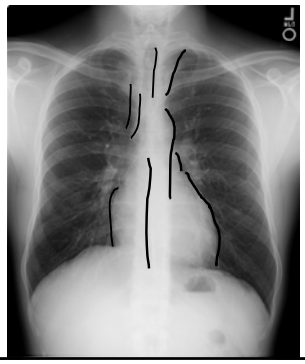


MedPix 8283
(Pending approval)

Carcinoma,Metastatic Breast with Pleural Effusion 4063

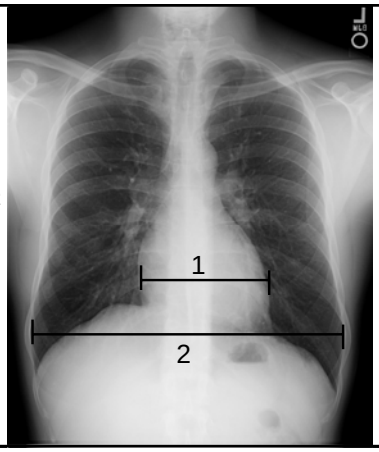


3. Evaluate mediastinal contours, edges and shape.

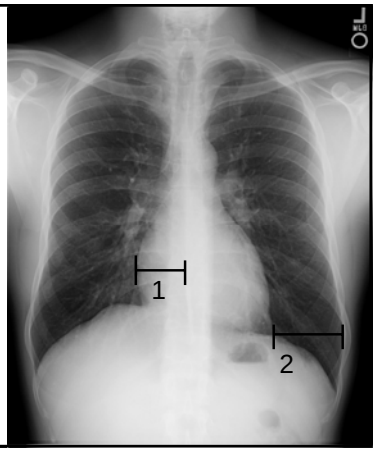


Cardiac Silhouette Size

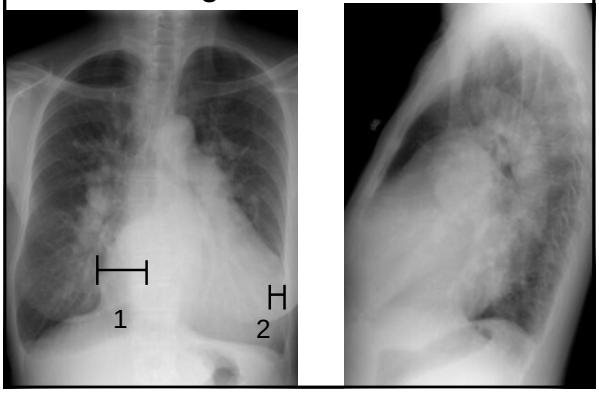
Normal 1 < (0.5)2
Top norm 1 = (0.5)2
Enlarged 1 > (0.5)2

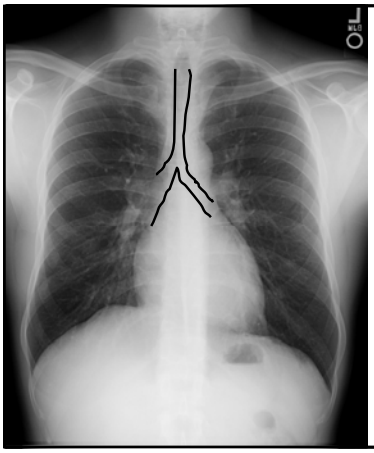


Normal 1 < 2
Top norm 1 = 2
Enlarged 1 > 2



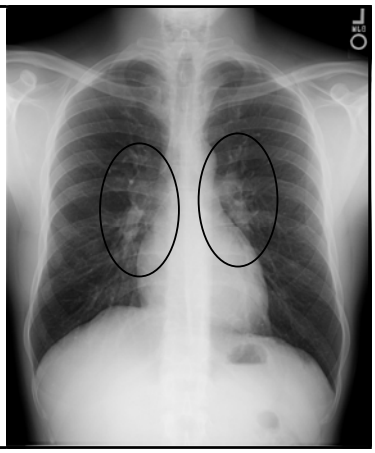
Enlarged Heart, COPD



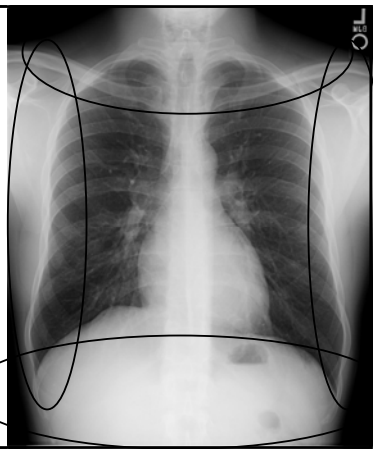


4. Follow trachea to carina and main bronchi.

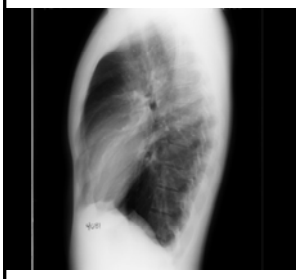
5. Look at both hila for enlargement and abnormal bulges.



- 6. Beginning at the neck, review the periphery of the chest (chest walls)
- Include the shoulders, ribs, clavicles, diaphragms
- Check the upper abdomen for free air and abnormal air collections



The lateral search pattern

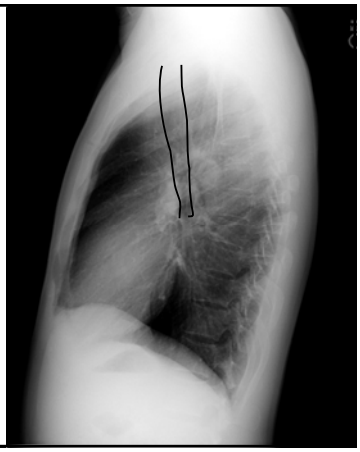


- **1. Overview**
  - **Already glanced at with PA**
  - **Can start with the lateral to challenge yourself and sharpen skills**
  - **Big picture**

2. Follow trachea from neck to hilum

– identify left bronchus (center of lungs)

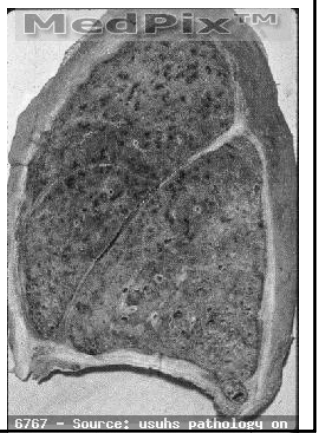
– analyze pulmonary arteries

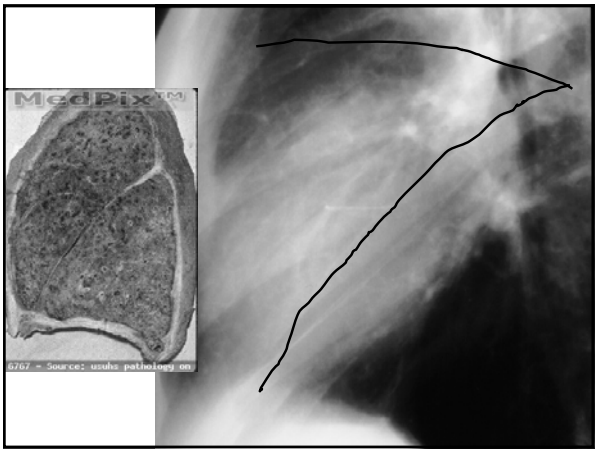


3. Markings and fissures

– all vessels radiate from hila

– look for extra markings - linear or nodular



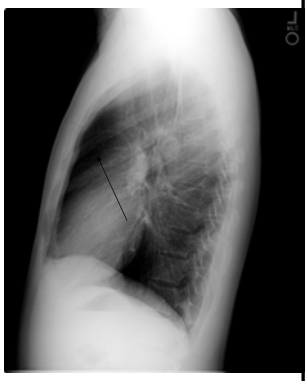


4. Hila to diaphragm

– darkening with no horizontal edges

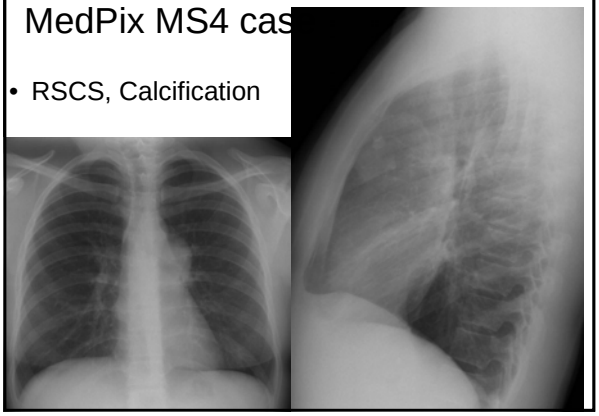
5. Posterior heart up to anterior chest wall

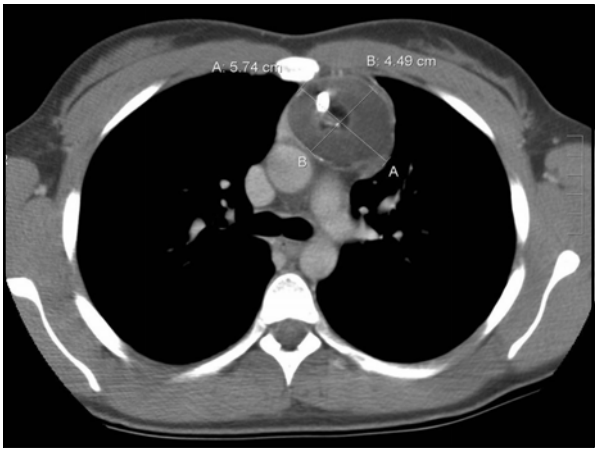
- Darkening above heart
- Should not cross any edges



MedPix MS4 cas

- RSCS, Calcification





Differential Diagnosis:

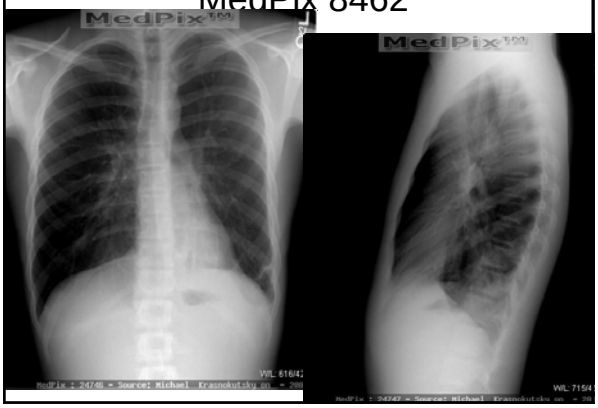
Teratoma - benign or malignant
Thymoma
Lymphoma
Thyroid mass
Mediastinal cyst
Metastatic disease
Seminoma
Embryonal tumor
Lymphadenopathy

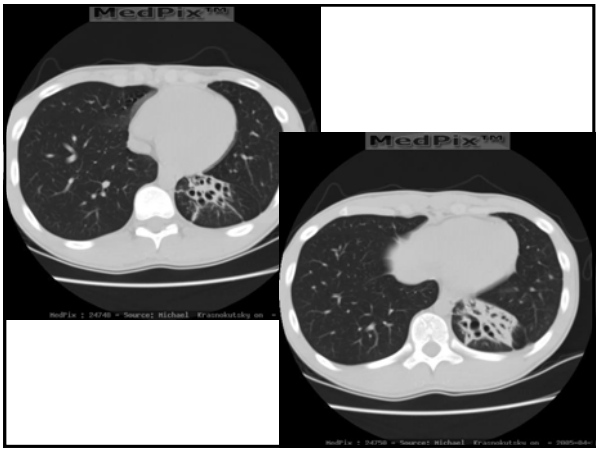
6.Vertebral bodies

Should see darkening as you move downward

Normal “spine-sign”

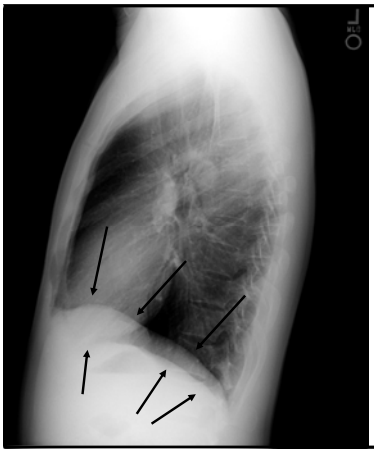
MedPix 8462





Bronchiectasis

- **Bronchiectasis is defined as irreversible local dilatation of the bronchial tree with associated bronchial wall thickening. Clinically most patients present with cough (usually chronic), recurrent infections and hemoptysis. Although not a single disease process, bronchiectasis remains a descriptive final common pathway for several distinct disease processes. Etiologies include: Post-infectious: Measles, whooping cough, TB and allergic bronchopulmonary aspergillosis)**

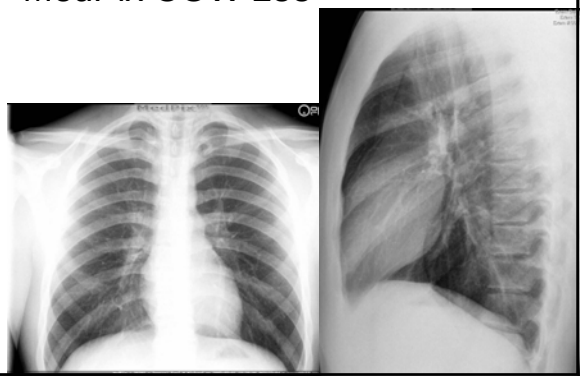


- **7. Diaphragm**
  - **White arrows Rt**
  - **Black arrows Lt**
  - **Can't always tell**

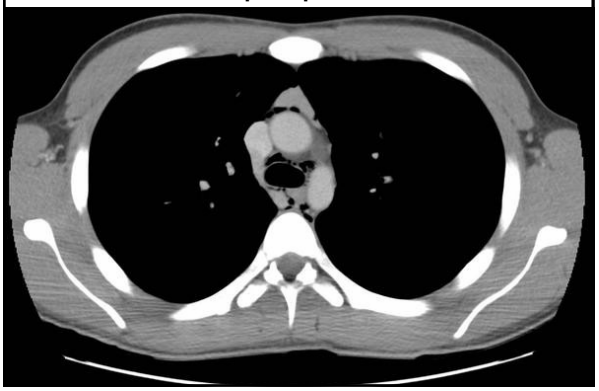
8. Anterior chest wall and lungs

– Rule out pneumothorax

MedPix COW 255



Note multiple pockets of air



- **9. Neck**
  - **Evaluate soft tissues**
  - **Rule out mass, FB**

- **10. Posterior ribs, spinous processes and costophrenic angles**

Proposed Mnemonic

May not be as inclusive, however, easier to recall?

- Airway
- Breathing
- Circulation
- Diaphragm
- Soft tissues
- Aorta
- Bones
- Cardiac
- Deformity
- Shoulder

Required structures

http://rad.usuhs.mil/medpix/medpix.html?mode=single&recnum=6043&table=card&srchstr=required%20structures&search=required%20structures#top

A. Lungs
Markings (Vessels)
Minor Fissure (not always visible but must know location)

B. Mediastinum
SVC
Right Paratracheal Line
Right Atrium
Left Ventricle
Main Pulmonary Artery (Trunk)
Aortic Knob
Descending Aorta
Left Paratracheal Edge
Azygoesophageal edge

C. Airways
Trachea
Carina
Main Bronchi

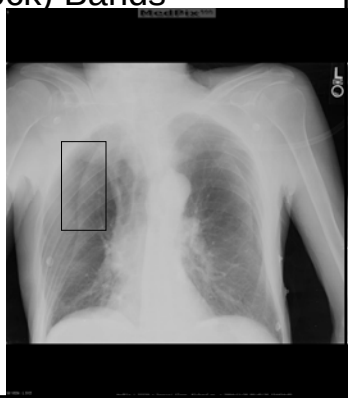
D. Hila - Left and Right Pulmonary Arteries

E. Soft Tissues
Neck
Chest Walls
Breast Shadows
Diaphragms
Bowel Gas

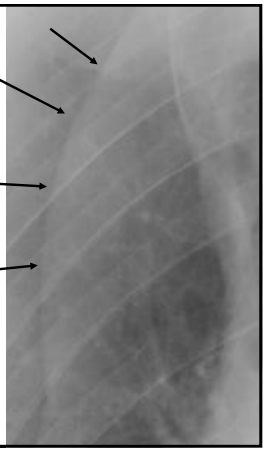
E. Bones
Ribs (Anterior and Posterior)
Clavicles
Scapulae
Humeri
Spine
Bodies and Disc Spaces
Spinous Processes
Pedicles

Mach (not mock) Bands

- **Ernst Mach**
- 1838-1916

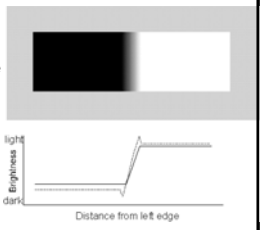


- Skin folds, not ptx
- Apparent dark line
  - Mach band

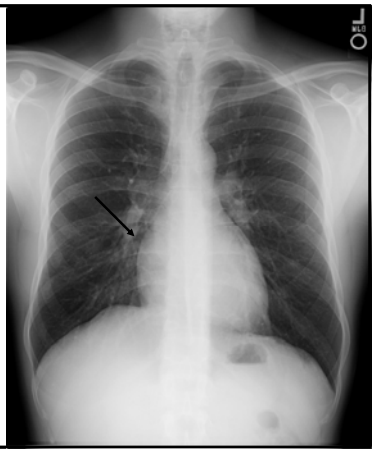


Mach Bands Explained

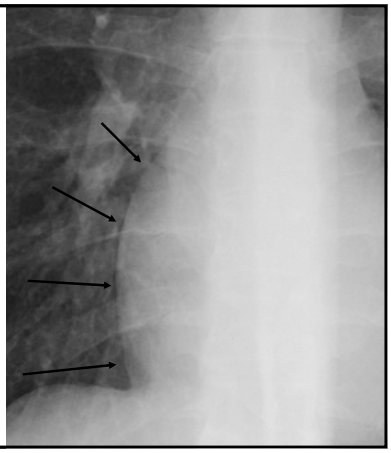
The solid black curve represents the amount of light being reflected from the figure at the top. The red curve represents the brightnesses of this figure as it is usually perceived.
To the left of the point where the figure just starts to get lighter people usually see a dark bar that is slightly darker that the area to the left of it.
At the point where the brightness just stops increasing, people usually perceive a bright bar.
This phenomenon was discovered by the famous physicist, Ernst Mach and it is in his honor that these dark and bright bars are called Mach Bands. These Mach Bands can be explained by center-surround receptive field interactions which is discussed elsewhere in this book.



- http://www.yorku.ca/eye/machband.htm



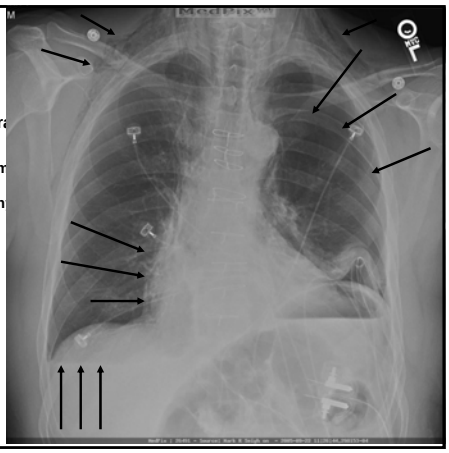
Mach Bands

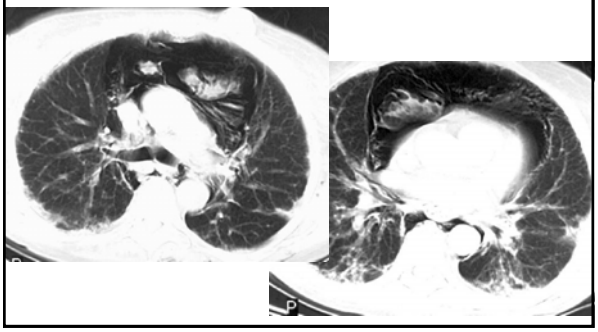


HPI: 67 y/o male POD#1 s/p sternotomy for 3 vessel CABG

PE:

-Crepitus in neck tissue and decreased breath sound in left lung field





Differential

- Necrotizing faciitis
- Odontogenic infection
- Surgery
- Trauma (blunt/penetrating)
- Alveolar rupture
- Baro trauma/Air travel
- Boerhaave's syndrome
- Spontaneous Pneumomediastinum (SPM)

Epidemiology

Varies with the cause

- 1/800 to 1/40,000 SPM in pediatric pts.
  - Peak incidence 2nd – 4th decade.
- 0.3% association w/ asthma over 10 yr pd.
- 40% occurrence with surgery.
- 73% association between SE and PM

Major Chest Imaging Patterns

- •Mass
- •Consolidative
- •Interstitial
  - -Linear
  - -Nodular
- • Vascular
- • Airway
  - -Obstructive
  - - Wall thickened

Summary

- Systematic approach, checklist
- Get into routine
- Check everything on the images
- Remember normal radiographic anatomy
- Systematic description
- Patterns
- ARS Quiz
- Announcements